A new report from GRAIN follows up on the fate of hybrid rice in Asia. An earlier study in 2000 saw the push for hybrid rice coming from the seed industry as a stepping-stone to genetically modified (GM) rice. The report looks at how hybrid rice has fared with farmers and the shifting dynamics and ambitions of those pushing hybrid rice in the region. Despite continued enthusiastic support from seed companies and international agencies, hybrid rice continues to be viewed by farmers as a pretty useless technology and the area planted has increased little in the last five years.

Fiasco in the field:

An update on hybrid rice in Asia

GRAIN

In the early 1990s, it looked as if hybrid rice was on the way out. Companies drawn in by dreams of creating a hybrid seed market for rice akin to the North American hybrid maize market, were exasperated by years of investment without any returns. The International Rice Research Institute (IRRI), the agency leading the research effort, had not produced a single successful variety despite years of trying. China was the only country with a significant area planted to hybrid rice, but this too seemed to be in danger of decline as the state started to claw back its direct subsidies and support.

By the end of the decade, hybrid rice was making a comeback. An Asia Development Bank (ADB) financed project, led by the UN Food and Agriculture Organisation (FAO) and IRRI, was resurrecting hybrid rice from the ashes. Hybrid rice was commercialised in several countries, transnational seed companies renewed their interest, and the area sown to hybrid rice was, according to FAO and IRRI, on the rise across Asia.

But the overall hybrid rice area in Asia has not changed much since 2000.[1] In China, by far the world's biggest producer of hybrid rice, the hybrid rice area has declined since 1997 and remains confined to the southeast and south central parts of the country.[2] In India, where hybrid rice has been on the market for nearly ten years, hybrid rice cultivation has fallen off in the initial areas where it was introduced and is currently confined to small areas where there are government and seed industry "on-farm demonstration programmes".[3] In 2000, it looked like hybrid rice might make inroads in Pakistan, Indonesia, Malaysia and Sri Lanka, but

[1] Biothai (Thailand), GRAIN *et al*, *Hybrid Rice in Asia: an unfolding threat*, GRAIN, March 2000. www.grain.org/briefings/?id=136

[2] Interview with Yuan Longping, 9 November 2004.

[3] Email communication from Janaiah Aldas.

at present there is little or no hybrid rice planted in these countries. There is no market for hybrid rice in Thailand either, one of Asia's leading rice producers. FAO's efforts to develop hybrid rice for Burma have faltered, with only small pockets of land being sown with hybrid rice seeds imported from China. The same appears to be happening in Laos. In Bangladesh, the hybrid rice seed market has not lived up to expectations. It remains small and dominated by imported Chinese and Indian varieties, not adapted to local conditions.[4]

Vietnam and the Philippines are the only countries with major increases in hybrid rice production since 2000. Yet hybrid rice production in Vietnam is confined to the North of the country and still dominated by seed imported from China. There may be more local hybrid rice seed production in the Philippines, but it survives on state subsidies and support, and the 170,000 ha planted in 2004 falls far short of the 400,000 ha the government was aiming for.[5]

The push continues

The slow, and at times negative, growth rate of the hybrid rice area in Asian rice-producing countries hasn't deterred its proponents. The FAO still promotes hybrid rice and gave it special attention during the 2004 "Year of Rice". IRRI, with support from the ADB, also continues to be a central actor, providing new parental lines, technical assistance and help to the industry in getting governments to adopt favourable regulations.[6] IRRI recently considered a proposal from the Asia Pacific Seed Association (APSA) to adopt a consortium model of partnership with private companies, where each company pays a membership fee to get exclusive rights to IRRI's hybrid rice lines for a certain period of time.[7] IRRI's management rejected the industry's proposal, but is now developing an alternative arrangement.[8]

Meanwhile, the private sector is more determined than ever to get hybrid rice off the ground. More seed companies and more NGOs are now involved, even though many of them are either distributing imported seeds or producing hybrid seeds with imported parental lines that they've licensed from foreign companies, particularly from China. Only a handful of companies are involved in breeding work, and they are aggressively building up their regional presence. Most of these are US and European transnationals, but there are a couple of Chinese and Indian companies with a significant presence as well.

India and China are shaping up as the main hubs for the hybrid rice seed industry in Asia. These countries have the best conditions for the production of hybrid rice seed: big potential markets, a suitable climate, lax seed regulations, strong public research programmes open to partnership with the private sector, and cheap labour. India is home to the main hybrid rice seed operations for Bayer, DuPont, Monsanto, Shriram Bioseed and Syngenta. They are eager to tap into the country's large potential market and to use it as a base to export seeds to Bangladesh, Indonesia and Vietnam. DuPont, which already derives nearly half of its seed revenues in India from rice, told the Times of India:

> "Our calculations are simple. Paddy farmers today are buying just 1,900 tonnes of hybrid seed annually. This translates into just 0.3% hybridisation in India. In the 12 million ha we'd like to initially focus on, this means just 1% of the area under rice. In comparison,

[4] UBINIG, *Undesired promotion of hybrid rice in Bangladesh*, Dhaka, Bangladesh, forthcoming.

[5] Figures from the Philippines Department of Agriculture.

[6] Minutes of the meeting of the Asia Pacific Seed Association's Special Interest Group on Hybrid Rice, 19 November 2003, Bangkok.

[7] *Ibid.*

[8] Interview with SS Virmani, IRRI, 1 September 2004.

Area planted to hybrid rice in various Asian countries

Country	Area cultivated with hybrid rice (ha)			Hybrid rice as % of rice area (2003)
	1997	2001	2003	
China	17,708,000	15,821,000	15,210,000	52%
Vietnam	187,000	480,000	600,000	8%
India	120,000	200,000*	< 200,000*	<1%
Philippines	500	90,000	107,000	3%
Bangladesh	0	20,000	49,655	<1%
Burma	0	10,000	unknown	-
Pakistan	0	0	field trials	-

Source: Data from 1997 and 2002 are from the FAO; data from 2003 is based on official national figures except where indicated.
* The figures circulated by IRRI are 200,000 ha and 280,000 in 2001 and 2003 respectively and are based on the figures given by hybrid rice seed breeders. However, there are no official figures for 2003 and, according to one of India's leading researchers on hybrid rice adoption, Aldas Janaiah, hybrid rice production is currently confined to small areas where there are on-farm demonstrations.

Major hybrid seed companies in Asia

Company	Subsidiaries and joint ventures
Bayer (Germany)	Hybrid Rice International (India)
Dupont/Pioneer (USA)	SPIC (India)
East-West Seeds (Netherlands)	HyRice Corporation (Philippines)
Monsanto (USA)	MAHYCO (India)
Shriram Bioseed Genetics (India)	
Syngenta (Switzerland)	
Yuan Longping High-Tech Agriculture (China)	SLAC (Philippines) Guard Rice (Pakistan) PT Bangun Pusaka (Indonesia) Aftab Bahumukhi Farm/Islam Group (Bangladesh)

Sources: company websites, reports and press releases.

> China has more than half its paddy fields under hybrid rice. Helping India move into that direction is a tremendous opportunity for us."[9]

Yet DuPont and the other seed giants are experiencing many bumps along the way. So far they have not produced a hybrid rice variety that Indian farmers will pay for. The hybrid rice area in India is shrinking because farmers that try it once are not interested in trying it again.[10] They also face public hostility to their efforts to move in and control the market. Syngenta had to back away from a controversial deal with the Indira Gandhi Agricultural University in Raipur that would have given the company commercial rights to over 19,000 rice varieties held by the university that were collected from local farmers in the 1970s. Syngenta had planned to draw on the collection for its hybrid rice breeding programme and would have marketed new hybrids developed under the collaboration upon payment of royalties to the university. But widespread public protest broke out when news of the deal was leaked in November 2002 and the deal eventually collapsed.[11]

The Philippines is trying to fashion itself as a player in the hybrid rice seed industry as well. Monsanto has breeding operations that it purchased from Cargill, as does East West Seed Company's subsidiary HyRice Corporation, which works with parental lines from IRRI. Nevertheless, seed production conditions in the country are so deficient that the government is basically bribing farmers to produce seed. The government is buying seeds at a subsidised rate and offering farmers US$180 in cash and freebies like bacterial leaf blight stoppers or organic fertilisers. This is on top of the subsidies, credit packages and other promotions it already provides to the farmers buying the seed. Despite all of this government support, hybrid rice seed donations continue to come in from China.

China remains the heavyweight of the hybrid rice seed industry and in recent years it has changed from a completely domestic industry to a global player, with activities spread across the Americas and Asia. The Chinese companies differ from their American and European counterparts, in that they are tightly linked to the state and most of their international activities are limited to licensing arrangements, joint ventures or even donations. But the situation in China is changing, as China begins to let foreign seed multinationals in and as it builds up seed multinationals of its own.

Hybrid rice on the farm

The beautiful photos of scientists standing in fields of hybrid rice that circulate in the media can't hide the fact that, on the farm, hybrid rice just isn't working in Asia and farmers are rejecting it (see box over page). The seed is expensive to produce (up to US$2,000 per ha), so heavy subsidies are needed for farmers to be able to afford it. Hybrid

[9] Nidhi Nath Srinivas, "Hybrid rice potential has MNCs drooling," *Times of India*, 2 October 2003.

[10] PG Chengappa *et al*, Profitability of Hybrid Rice: Karnataka Evidence, *Economic and Political Weekly*, 21 June 2003, 38(25), 2531-2534; Aldas Janaiah, "Hybrid Rice in Andhra Pradesh", *Economic and Political Weekly*, 21 June 2003, 38(25), 2513-2516; C Ramasamy *et al*, "Hybrid Rice in Tamil Nadu", *Economic and Political Weekly*, 38(25), 2509-2512 21 June 2003.

[11] Walter Smolders, *Access and benefit sharing: Analysis of some case studies*, 11 August 2004, Syngenta, New Delhi; GRAIN, "Trouble in the Rice Bowl", *Seedling*, April 2003: www.grain.org/seedling/?id=235.

IRRI

IRRI scientists show hybrid rice panicles from a test plot to World Bank Senior Vice President Joseph Stiglitz.

Bangladeshi farmers unimpressed

Unlike some other Asian countries, in Bangladesh the government's role in supporting hybrid rice has been limited to assuring a conducive regulatory environment, participating in the occasional promotional programme and carrying out some breeding work. The main protagonists are large NGOs like BRAC that collaborate with multinational seed companies. But despite heavy promotion at the local level — in the form of leaflets, posters, publicity banners, village meetings, broadcasts through megaphones and advertisements on radio and TV — sales of hybrid rice seeds remain low. In 2003, less than 50,000 ha were planted to hybrid rice in the country. As one BRAC official admitted, "We have never received a farmer who came to us through their own interest of receiving hybrid seeds."

The performance of hybrid rice in Bangladesh has been lacklustre at best. A 1999 study of 173 farmers growing both hybrid rice and "high-yielding varieties" on their farms found that, while the hybrids were higher yielding, the costs of inputs were 23 percent higher. The farmers surveyed described high seed costs, the need for more crop care and management time, low yield gains, high pest and disease attack, low profits and lack of suitability for home consumption. Three-quarters of the farmers surveyed said that it was unpalatable.

A more recent study paints a similar picture. These farmers talked about pest problems, the "technical" management practices required, high seed costs and poor eating quality. Overall, most of the farmers consulted felt manipulated by the promotional tactics of the seed dealers and few planned to plant hybrid rice seeds again. According to Mohammed Imamuddin, an agricultural extension officer from Noakhali who was interviewed for the study, "Although we talk about higher yields, hybrid rice has many problems. The price of seeds is very high, beyond the purchasing power of small farmers. It cannot be sold in the market and the government does not purchase it either."

Sources: M Hossain *et al,* "Hybrid Rice in Bangladesh: Farm-level Performance," *Economic and Political Weekly,* June 21, 2003: p 2518; UBINIG, "Undesired promotion of hybrid rice in Bangladesh", Dhaka, Bangladesh, forthcoming.

Bangladesh has the highest population density in the world owing to its rich agricultural land. In many areas, two rice crops are grown each year.

rice remains susceptible to disease, and eating quality is still a big problem in many countries. Farmers regularly receive lower prices for hybrid rice than their traditional varieties. In China, the market price for hybrid rice can be a third of the price for conventional rice, and many farmers are now shifting back to traditional rice varieties that are of higher quality and higher market value.[12] One recent study even suggests that if yield is the objective then there's no need for the headaches involved in producing hybrid seeds. Researchers in Greece were able to continuously select from an F1 generation of hybrid rice and produce a variety that was equally high-yielding but of better grain quality and, most importantly, that farmers could save from year to year without problem (see box on opposite page).[13]

Wrong solutions to the wrong problem

There's no mystery to the seed industry's interest in hybrid rice. Hybrid rice grains can't be replanted, so farmers have to buy seed every year. But this is hardly a justification for the involvement of governments and agencies like IRRI or the FAO that are supposed to be working in the interests of the poor and poor farmers in particular. Instead, they talk about how hybrid rice will increase yields and, therefore, feed more people, as if the complex problem of hunger can be reduced to the genetics of the rice plant.

Techno-fixes for hunger like hybrid rice address the wrong problem: production, measured through a narrow prism of rice grain yields per hectare. The real problems are poverty and distribution. In the US, more than a quarter of the 160 billion kilos of edible food produced each year for human consumption is lost to waste by retailers, restaurants and consumers.[14] In India, where some 320 million people suffer from hunger, the country has a food surplus of 65 million tonnes.[15]

Hybrid rice only perpetuates and exacerbates poverty. It shifts control off the farm, to scientists and corporations, as it displaces local varieties and prevents farmer seed practices of saving, exchange and plant breeding that are the foundation of agricultural systems that serve the needs of rural communities. In China, state support for hybrid rice over the past few decades has helped fuel a 46-fold reduction in local rice varieties and undermined the sustainability of farms.[16] "The paddy field seems to have got addicted to heroin," says researcher Li Qibo. "The more rice output you want from it, the more chemicals you have to give it."[17] Similarly, if the Vietnamese government is really interested in supporting agriculture and food security in

the North, it has better options rooted in local farming practices. Instead of putting the bulk of its resources into the development of hybrid varieties, the government could look at supporting farmer seed selection, saving and exchange practices, since these continue to be the main source of seeds for rice farmers in northern Vietnam.[18]

Hybrid rice will only make farmers more vulnerable to outside actors that can manipulate conditions to enhance their own profits. If it ever does increase production, these powerful actors will capture all of the benefits. Not that the consequences for small farmers have ever been at the forefront of research into hybrid rice. For China's "Father of Hybrid Rice", Yuan Longping, "The fewer peasants, the better. With so many peasants, the country won't be well-off . . . If I increase the unit output of rice dramatically, one part of rural labour will be liberated while ensuring the total output of grain. I hope that at least 50% of them can walk away from the field."[19]

The seed industry is not about to abandon its efforts to develop a hybrid rice seed market. APSA's Special Interest Group on Hybrid Rice recently declared India to be a hybrid rice "success story". This takes a bit of imagination! Wherever hybrid rice has been introduced in India, farmers have rejected it. Seed companies are forced to move from area to area looking for new markets where farmers have not had enough experience with hybrid rice to chase them away. But APSA points out that seed production yields in India are high (meaning they can produce seed for cheap) and, in India, they have "the freedom to commercialise the hybrids without any government testing [which] has helped many companies to come up with a large array of hybrids" – i.e. hybrids that otherwise wouldn't be allowed on the market![20]

The seed industry's success is in developing a base of hybrid varieties that they can use to launch their genetically modified (GM) varieties. Hybrid rice actually serves as a justification for GM. Conventional breeding practices are more difficult with hybrid rice, making it more difficult to breed for qualities like disease or pest resistance. Hybrid rice is thus susceptible to several diseases and efforts are now underway to develop hybrid varieties genetically engineered for resistance to bacterial leaf blight and rice stem borers.[21] Hybrid rice scientists also say that they need GM in order to meet their much-hyped yield targets for "super rice". One techno-fix becomes the justification for another, and each time farmers have to shoulder the costs and consequences.

Hybrid rice is also likely to be a major source of GM contamination. The institutions working on hybrid rice, whether IRRI or Monsanto or the Hunan Hybrid Rice Research Centre, are also experimenting with GM hybrid rice, most likely in the same fields or laboratories where they work with conventional varieties. The risk of contamination is therefore already present and concerns the entire region, because these institutions regularly send hybrid seeds and parental lines across borders.

Careful selection sustains hybrid yield

Hybrids are produced by crossing two inbred – genetically fixed – varieties of a particular crop. Hybrids are special because they express what is called "heterosis" or hybrid vigour. The idea is that if you cross two parents that are genetically distant from each other, the offspring will be "superior", particularly in terms of yield. However, the so-called heterosis effect disappears after the first (F1) generation, so it is pointless for farmers to save seeds produced from a hybrid crop. This makes it very profitable to go into the seed business, since farmers need to purchase new F1 seeds every season to get the heterosis effect (high yield) each time.

Between 1989 and 1995, two researchers with Greece's National Agricultural Research Foundation and the Aristotelian University of Thessaloniki undertook an experiment to see if they could generate high-yielding varieties from the progeny of hybrid rice seeds purchased in the local market. Through the use of two well-known selection methods, the researchers had no problems developing a number of lines with yields equal to or higher than the original hybrid and with superior quality as far as total milling yield, grain vitreosity, grain length, and grain length/width ratio. According to the their report, "It was concluded that application of combined selection for yield and quality could lead to the isolation of recombinant inbred lines with equal yielding ability and quality equal to or higher than the F1 hybrids." In other words, the heterosis of hybrid rice is "fixable" and there's no need to go through the elaborate practice of hybrid rice seed production or of forcing farmers to purchase seed every year. The researchers' concluded that "hybrid breeding in rice is not justified either genetically or economically."

Source: DA Ntanos and DG Roupakias, "Rice F1 hybrids: the breeding goal or a costly solution?" *Australian Journal of Agricultural Research,* 54: 1005-1011, 2003.

[12] "Rice price being monitored closely," *China Daily*, March 05, 2004: http://english.peopledaily.com.cn/200403/05/eng20040305_136575.shtml PLEC China Cluster, *Final Cluster Report: Summary of results and achievements from 1998-2001:* www.unu.edu/env/plec/country/china/index.htm#contactchina.

[13] DA Ntanos and DG Roupakias, "Rice F1 hybrids: the breeding goal or a costly solution?" *Australian Journal of Agricultural Research*, 54: 1005-1011, 2003.

[14] Haider Rizve, "Food waste and hunger exist side by side", *IPS*, 28 September 2004. www.ipsnews.net/print.asp?idnews=25343

[15] Devinder Sharma, "Food for Future: Trade, Biotechnology and Hunger," Talk delivered at an international conference on Trade and Hunger in Oslo, Norway, 7-8 June 2004.

[16] Pei Yanlong *et al*, "What is Happening to the Diversity of Rice Genetic Resources in China", in T Partap and B Sthapit (eds), *Managing Agrobiodiversity - Farmers' changing perspectives and institutional responses in the Hindu Kush-Himalayan Region*, 1998.

[17] "Challenges planted in the rice industry," *China Daily*, 29 October 2004: http://news.xinhuanet.com/english/2004-10/29/content_2152331.htm

[18] Le Thu Anh and Elise Pinners, *Good Seed From The Informal Rice Seed Sector: A study on the local rice seed sector in northern Vietnam*, VECO Vietnam, January 2003. www.mekonginfo.org/mrc_en/doclib.nsf/0/56CE0002CAB35/$FILE/FULLTEXT.html

[19] Huang Yikun Loudan, "Yuan Longping Harvest Again," *Economic Observer*: www.eobserver.com.cn/english/readnews.asp?ID=55.

[20] Minutes of the meeting of the *Asia Pacific Seed Association's Special Interest Group on Hybrid Rice*, 19 November 2003, Bangkok.

[21] Swapan Datta, "First IRRI-PhilRice Field Evaluation of Transgenic Rice Held at Muñoz, Philippines", *IRRI Bulletin*, 12 September 2002; Wenxue Zhai, "National Transgenic Plant Program in China is supporting the development of GM hybrid rice modified with Xa 21 transgenic material": www.genetics.ac.cn/xywwz/Faculty/ZhaiWenxue.htm.

Conclusion

Resistance to hybrid rice is progressively building in Asia. From militant landless peasants to moderate farmers testing and advocating ecological and sustainable agriculture, people are organising to increase public awareness, share information, strategise actions, and continue developing farmers' alternatives. They've seen hybrid rice fail in their fields or those of their neighbours and they don't buy the government propaganda that says hybrid rice will trigger rice self-sufficiency and reduce incidence of hunger and poverty. For them hybrid rice merely displaces productive farmers' varieties and sustainable farm practices that serve as bases of food security and sovereignty.

Yet, despite the failure of hybrid rice to improve conditions for the vast majority of farmers, many of them continue to be lured into producing hybrid rice through government programmes and subsidies or micro-credit schemes. Awareness is therefore critical. There is a need for more national and regional sharing of experiences combined with clear positions on hybrid rice. Hybrid rice is an expensive technology that undermines local efforts at food security and sustainable agriculture. It serves the interests of big business, not small farmers, and will provide transnational seed companies with an entry point for their GM rice. Government support for hybrid rice must therefore be denounced as an effort to facilitate corporate control of the rice seed supply and production systems and an attack on small farmers. Public resources would be much better spent addressing the structural problems affecting agriculture in Asia, looking for political solutions rather than technical ones, and pursuing policy reforms that create space for farmers to strengthen their alternatives, instead of going big and quick along the path of GM rice and corporate control.

GRAIN's full report "Fiasco in the Field: An update on hybrid rice in Asia", is available from our website at www.grain.org/briefings/?id=190.

Via Campesina launches tsunami relief campaign

Via Campesina, the global alliance of peasant, family farmer, farm worker, indigenous and landless peoples organisations, and other rural movements, is calling for solidarity with the millions of people affected by the tsunami disaster has launched a global fundraising campaign to channel assistance to affected communities of fisherfolk and peasants, for their own relief and reconstruction efforts. The rehabilitation efforts will be channelled through grassroots organisations.

Via Campesina is asking for donations for direct emergency support to provide basic needs of food, clean drinking water, shelter and health care to affected fisherfolk and peasant families, as well as to help them initiate the long term work of reconstructing their communities and livelihoods.

The relief philosophy of Via Campesina is that these communities should participate actively and be the key actors in the reconstruction process, and that their fisherfolk and peasant organisations should play a key mobilising and supporting role. Via Campesina wants to give these communities and their organisations the political support they need in this process, and to help get them the funds they need for reconstruction. The funds raised in this campaign will be used to strengthen local communities as the key actors in this process. The success of local, self-organised, civil society disaster relief efforts in previous disasters in Latin America, Asia, and Africa, contrasted with government inefficiency and top-down, demobilising programmes, has often marked a key stage in the empowerment and growth of large, popular, grassroots, civil society social movements by which previously marginalised people take control of their own lives.

In addition to the millions who have been displaced or affected, many tens of thousands have lost their homes and fishing equipment or farming tools. Fisherfolk have lost their boats, and the land of peasant families has been contaminated, their crops destroyed and their farm animals lost.

Via Campesina has a number of member organisations in the tsunami-affected region that are active in relief work and will be part of the reconstruction process. These include the Indonesian National Peasant Federation (FSPI), MONLAR in Sri Lanka, the Assembly of the Poor in Thailand, and others. Via Campesina is also working closely with two fisherfolk organisations that are members of the World Forum of Fisherfolk People, with whom it has been collaborating for several years in different ways at the international level. These are the National Organisation of Fisherfolk in Sri Lanka and the National Fishworkers Forum in India. At the moment the funds are being equally distributed in Indonesia, Sri Lanka, Thailand and India. As the emphasis moves from emergency relief to reconstruction, more countries and organisations may be added.

Donations can be made on line, by mail or wire transfer.

For more information, contact Via Campesina:
http://www.viacampesina.org
Email Nico Verhagen, coordinator: nico.verhagen@t-online.de